

# A New Device for Surgical Splint Construction

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**D**entoalveolar compensations that can occur as a result of skeletal jaw dysplasia include changes in the cant or vertical level of the occlusal plane. Generally, the more severe the skeletal discrepancy, the greater the amount of adaptation. Complete decompensation of the occlusal plane is a prerequisite for a good surgical-orthodontic treatment result.

Today's surgical approach usually involves a Le Fort osteotomy of the maxilla and a ramal osteotomy of the mandible, with three-dimensional repositioning of the jaws and the occlusal plane.<sup>1,2</sup> In planning treatment, the surgical movements are duplicated in model surgery. The standard setup technique has been found to be inexact, however, especially when the jaws are moved in several dimensions simultaneously.<sup>3,4</sup>

Various systems have been developed for more accurate repositioning of the jaws in model surgery. One, an Orthognathic Occlusal Relator, consists of micro-adjustable plates, fossa extensions, and an incisal guide pin mounted on an articulator using the split-cast technique.<sup>5</sup> Another, a Model Positioning Appliance, omits the incisal guide pin, but controls the position of the maxillary cast by fastening it to the anterior end of a semi-adjustable articulator.<sup>6</sup>

A new device, the Surgical Jaw Relator,\*

\*Registered trademark of FACT, Inc., 427-5 Nonhyun-dong, Namdung-gu, Incheon, Korea.



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was designed for simple, three-dimensional repositioning of the upper and lower casts, allowing quick construction of surgical splints. This article describes the clinical application of the system.

## Setting Up the Surgical Jaw Relator

The Surgical Jaw Relator comprises horizontal and vertical adjustment arms and an incisal indicator (Fig. 1). The system can be screwed into the upper and/or lower mounting plate of any standard semi-adjustable articulator (Fig. 2). Because the space between the cast and the mounting plate is so narrow, the horizontal arm moves in only one plane of space (Fig. 3). The vertical arm, which moves in all three planes, is attached to the anterior portion of the articulator. Some rotations of the horizontal arm—for example, to correct the occlusal cant—require minor readjustments of the vertical arm. The incisal indicator slides along the incisal guide pin to orient to the maxillary incisor tip as the upper cast is repositioned.



**Fig. 1** Surgical Jaw Relator consists of horizontal and vertical arms and incisal indicator.



**Fig. 2 Surgical Jaw Relator attached to various semi-adjustable articulators. A. Panadent.\*\* B. SAM 2.\*\*\* C. Denar.† D. Hanau.†**

## One-Jaw Surgery

For a Le Fort maxillary osteotomy, the Jaw Relator is usually attached only to the upper part of the articulator (Fig. 3A); for single-jaw mandibular surgery, only to the lower part (Fig. 3B). Casts are mounted using a facebow transfer and a centric-relation bite registration (Fig. 4). It is important to make the casts as thin as possible vertically and to position the horizontal arm of the Jaw Relator as low as possible, especially for maxillary impaction surgery.

Reference points are marked with a pencil on both sides of each cast at the mesiobuccal cusps of the first molars (Fig. 5A). The cast of the jaw to be mobilized is loosened and moved into its desired position, as determined by clinical

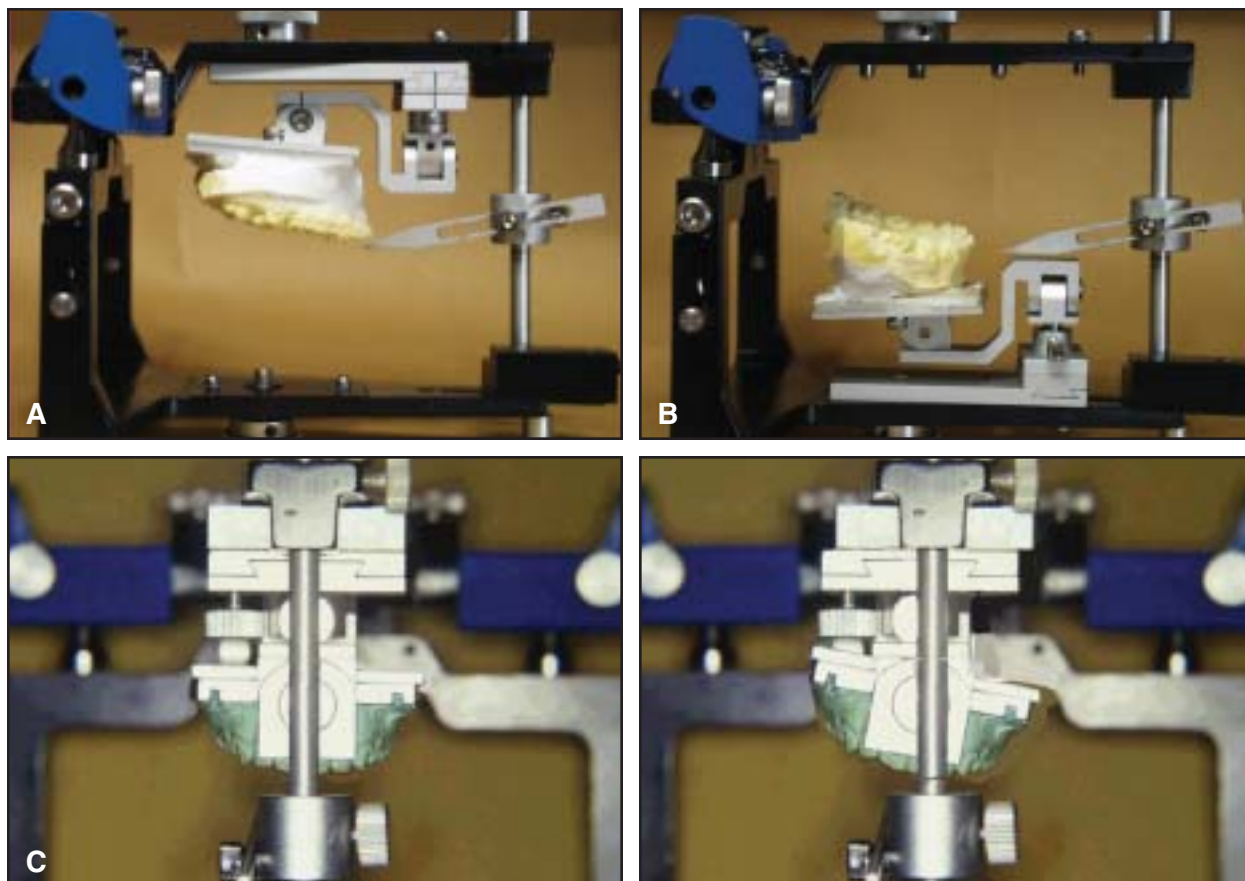
and cephalometric analysis, using the six adjustment screws. Vertical and horizontal displacements of the reference points after surgery can be measured with a compass (Fig. 5B,C).

A bite registration of the final position is taken with warm baseplate wax (Fig. 6). Because the Jaw Relator is referenced to the hinge axis and only one cast is repositioned, this bite registration reflects the hinge-closing effect of the mandible. The surgical splint made from the wax bite will thus serve as a template for accurate

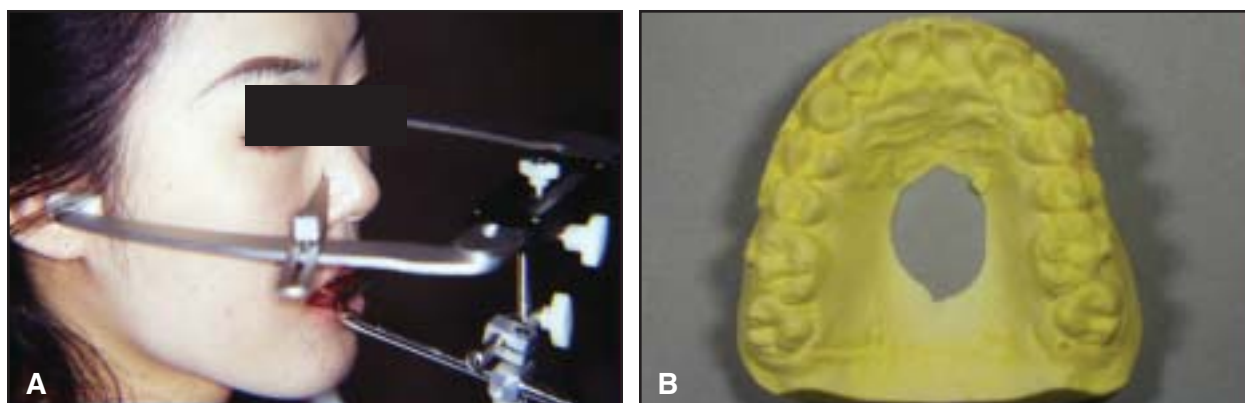
\*\*Panadent Corporation, 22573 Barton Road, Grand Terrace, CA 92313.

\*\*\*Registered trademark of Great Lakes Orthodontics, Ltd., 199 Fire Tower Drive, Tonawanda, NY 14150.

†Registered trademark of Water Pik Technologies, Inc., Newport Beach, CA.



**Fig. 3** A. Horizontal arm positioned between cast and upper part of articulator for Le Fort maxillary osteotomy, with vertical arm attached to anterior portion and incisal indicator attached to incisal guide pin. B. Surgical Jaw Relator attached to lower part of articulator for mandibular osteotomy. C. Rotation of horizontal arm to correct occlusal cant requires some readjustment of vertical arm.



**Fig. 4** A. Facebow transfer. B. Cast trimmed as thin as possible.



**Fig. 5** A. Reference points marked at mesio Buccal cusps of first molars on both casts. B. Vertical measurement of surgical displacement with compass. C. Horizontal measurement.

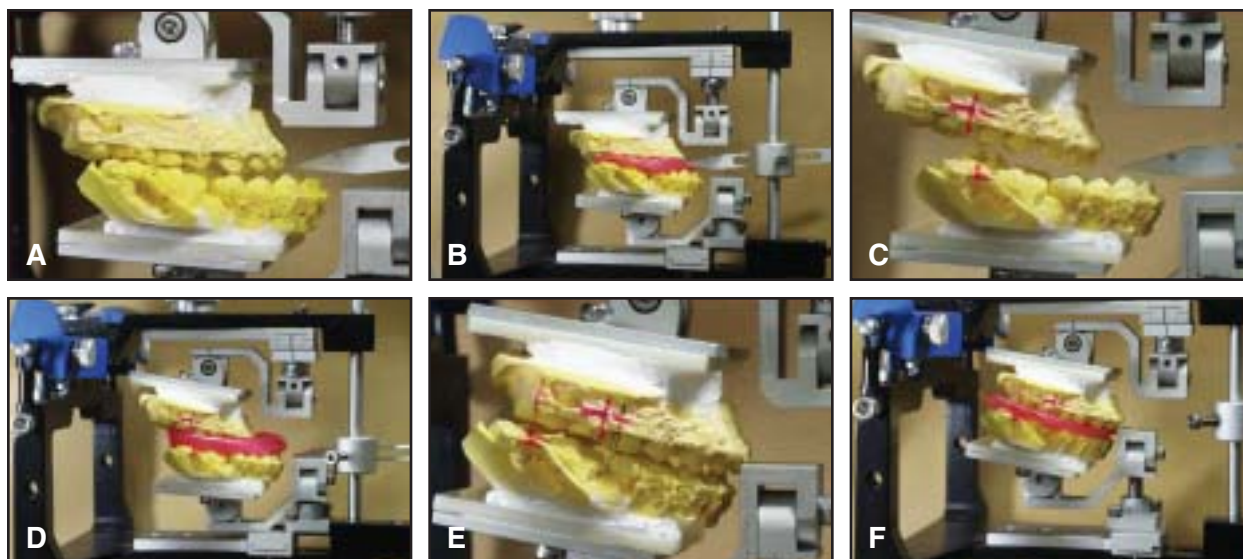


**Fig. 6** Bite registration of final position taken with warm baseplate wax.

location of the mobilized jaw during surgery.

## Two-Jaw Surgery

For two-jaw surgery, the Jaw Relator is attached to both parts of the articulator. If the surgery involves maxillary impaction, this procedure is performed first (Fig. 7). After the reference points are marked, the maxillary cast is loosened and adjusted to its planned postsurgical position. A warm-wax bite registration is taken for an intermediate maxillary splint. The lower cast is then moved into its planned position and fixed with the adjustable screws. The incisal pin



**Fig. 7** A. Initial mounting of prognathic case requiring two-jaw surgery with maxillary impaction. B. Wax bite registration for centric relation splint. C. Upper cast moved into planned position. D. Wax bite registration for intermediate splint. E. Lower cast positioned. F. Incisal pin reopened slightly for required thickness of final splint.



Fig. 8 A. Initial mounting of retrognathic case requiring two-jaw surgery with maxillary downgraft. B. Lower cast moved into planned position. C. Upper cast positioned, and incisal pin reopened for final splint.

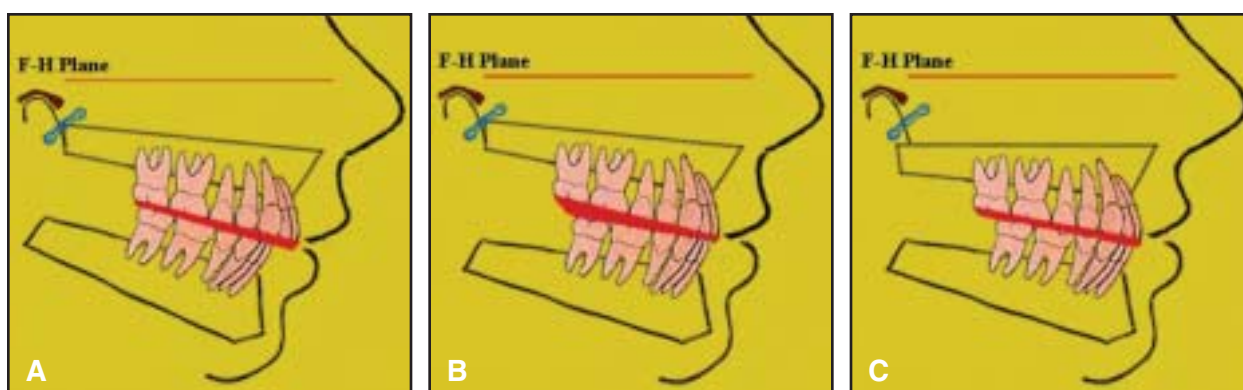


Fig. 9 A. Centric-relation splint for condylar seating. B. Intermediate splint for mandibular set-forward osteotomy. C. Final splint for maxillary downgraft.

should be reopened no more than the thickness needed for adequate strength of the final mandibular splint (Fig. 7F).

If the surgery involves a maxillary downgraft, the mandible is operated on first, reversing the procedure described above (Fig. 8). A warm-wax bite is taken for the intermediate splint used in the mandibular osteotomy, and the upper cast is then readjusted to produce a final maxillary splint and final desired occlusion. The occlusal vertical dimension is increased to provide adequate thickness of the final splint by opening the articulator with the incisal pin (Fig. 8C).

### Surgical Splint Fabrication

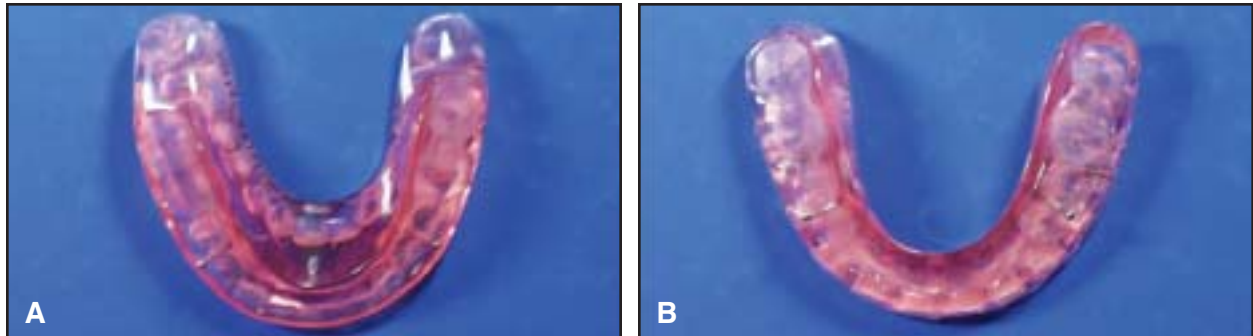
The Surgical Jaw Relator can be used to make centric-relation, intermediate, and final splints (Fig. 9). These surgical splints, which are usually fabricated from hard red cold-cure

acrylic, should incorporate the buccal and lingual surfaces of all the teeth in their planned occlusal relationship (Fig. 10). Because patients are in intermaxillary fixation for about six weeks, it is particularly important to make final splints as hard, nonporous, and glossy as possible.

### Conclusion

Advantages of the Surgical Jaw Relator system are as follows:

- It connects to any standard semi-adjustable articulator.
- It can be attached to the upper or lower part of the articulator, or both, depending on the surgical procedure.
- It provides controlled, three-dimensional positioning of the jaws.
- It is convenient and simple to operate, saving time for the clinician.



**Fig. 10 A. Polished intermediate splint. B. Final splint made of hard red acrylic.**

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